UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,537	01/19/2006	Michael Melkonian	1020-018US01	9911

28863 7590 10/06/2008

SHUMAKER & SIEFFERT, P. A.
1625 RADIO DRIVE
SUITE 300
WOODBURY, MN 55125

EXAMINER	
KIM, TAEYOON	

ART UNIT	PAPER NUMBER
1651	

NOTIFICATION DATE	DELIVERY MODE
10/06/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

pairdocketing@ssiplaw.com

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/565,537
Filing Date: January 19, 2006
Appellant(s): MELKONIAN ET AL.

Kelly P. Fitzgerald
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed June 24, 2008 appealing from the Office action mailed October 15, 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is substantially correct. The rejection of claims 20-21 under 35 U.S.C. 112, first paragraph, is hereby withdrawn in view of Appellant's arguments.

(8) Evidence Relied Upon

US 4,693,983	Davies et al.	9-1987
US 5,445,473	Chaverot et al.	8-1995

WO 1990/02170	Halling et al.	3-1990

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 18-28 stand rejected under 35 U.S.C. 102(b) as being anticipated by Davies et al. (US 4,693,983) in light of Chaverot et al. (US 5,445,473).

Claims 18-28 are drawn to a method for cultivating eukaryotic microorganisms comprising providing a perforated support having first and second major surfaces wherein the support being a sheet-shaped material and being impermeable to eukaryotic microorganisms or blue algae, applying the eukaryotic microorganisms or blue algae to the first major surface wherein the microorganisms remain immobilized, flowing an aqueous solution along the second major surface, wherein the flowing aqueous solution being transported to the first major surface by capillary forces, and the eukaryotic microorganisms or blue algae grow on the first major surface (claim 18); a limitation to the aqueous solution forming a distributing layer to distribute the solution across the second major surface of each perforated support (claim 19); a limitation to the distributing layer being a non-woven material comprising glass or plastic fibers (claim 20); a limitation to the distributing layer comprising a geotextile (claim 21); a limitation to the support and/or the distributing layer being hydrophilic (claims 22-24); a limitation to the support and the distributing layer comprising hydrophilic organic fibers (claims 25-27); a limitation to the method further comprising a second support , wherein two supports having the second major surface facing each other and arranged being in parallel to each other, and the aqueous solution being introduced and flowing between

the two supports in contact with the second surfaces (claim 28).

Davies et al. teach a method using a reactor for cultivating plant or animal cells. The reactor of Davies et al. comprises a porous (perforated) support having two groups of channels with inner walls; first channels for cell colonization (immobilization), and second channels for nutrients. Thus, the channels form major surface areas of the support. The biological materials (plant or animal cells) are bound to walls of the first channels which are impermeable to the material, and the liquid and/or gas (nutrients) are transferred between the first channels and the second channels through porous walls (see Fig. 1 and col. 2, lines 1-18). The transferr of liquid (nutrients) through the porous walls is inherently carried out by capillary forces because Davies et al. teach the materials for the support being a ceramic material, which has been leached in an acid or alkali to render the interior walls porous (col. 3, lines 47-50), and therefore, the transport of liquid or an aqueous solution through the porous walls of the support is inherently mediated by capillary forces.

Davies et al. also disclose porous walls being treated with a semi-permeable membrane such as cellulose acetate, which is inherently hydrophilic (distribution layer of a non-woven material) (col. 2, lines 24-26; col. 3, lines 57-61).

Furthermore, the bioreactor of Davies et al. comprises multiple channels formed with first major surfaces (channels where cells are immobilized) which face each other whereby liquid can flow between two facing first major surfaces (Fig. 1).

Although Davies et al. do not particularly teach “geotextile” for the support as in claim 21, the layer of cellulose acetate used as a coating to the support/reactor of

Davies et al. (col. 3, lines 57-61) is inherently considered as a geotextile because Chaverot et al. disclose that cellulose acetate is a source of geotextile (col. 2, lines 23-33).

Thus, the reference anticipates the claimed subject matter.

Claims 18-30 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Davies et al. (supra).

Claims 18-30 are drawn to a method for cultivating eukaryotic microorganisms comprising providing a perforated support having first and second major surfaces wherein the support being a sheet-shaped material and being impermeable to eukaryotic microorganisms or blue algae, applying the eukaryotic microorganisms or blue algae to the first major surface wherein the microorganisms remain immobilized, flowing an aqueous solution along the second major surface, wherein the flowing aqueous solution being transported to the first major surface by capillary forces, and the eukaryotic microorganisms or blue algae grow on the first major surface (claim 18); a limitation to the aqueous solution forming a distributing layer to distribute the solution across the second major surface of each perforated support (claim 19); a limitation to the distributing layer being a non-woven material comprising glass or plastic fibers (claim 20); a limitation to the distributing layer comprising a geotextile (claim 21); a limitation to the support and/or the distributing layer being hydrophilic (claims 22-24); a limitation to the support and the distributing layer comprising hydrophilic organic fibers (claims 25-27); a limitation to the method further comprising a second support, wherein

two supports having the second major surface facing each other and arranged being in parallel to each other, and the aqueous solution being introduced and flowing between the two supports in contact with the second surfaces (claim 28); a limitation to the method further comprising a step of removing the eukaryotic microorganisms or blue algae from the support by mechanical forces (claim 29) or chemical treatment (claim 30).

Davies et al. anticipate the subject matter of claims 18-28, and thus render them obvious (see above).

Davies et al. teach to remove contaminated cell compartment by flushing without disturbing the rest of the core (col. 4, lines 59-62). This teaching is considered as a mechanical harvesting of cells by flushing cells.

Although Davies et al. do not particularly teach a step of harvesting, it would have been obvious for a person of ordinary skill in the art to recognize the need of harvesting cells grown in the bioreactor of Davies et al. by using mechanical forces. In fact, Davies et al. teach that cells grown in a first major surface can be removed by flushing (col. 4, lines 57-62), indicating that the step of harvesting cells grown in Davies et al.'s bioreactor can be mechanically collected from the support matrix.

Although Davies et al. do not particularly teach the step of harvesting cells by chemical treatment as in claim 30, it would have been obvious to a person of ordinary skill in the art to optimize the step of harvesting cells. It is extremely well known in the art that there are several ways to dissociate cells from the cell culture support for harvest. A mechanical treatment such as flushing as disclosed by Davies et al. is one

way, and also a chemical treatment is well known in the art as a common means to dissociate cells. Thus, a person of ordinary skill in the art would readily select an optimized means from the based on the nature of cells grown on the support. Thus, selection of dissociation methods is a parameter to be optimized.

Furthermore, since a chemical treatment such as trypsin treatment is extremely well known in the art as a routine laboratory procedure for dissociating and harvesting cells grown on the support (culture dishes, etc.), a person of ordinary skill in the art would recognize such a technique as a predictable solution and/or one of known options for harvesting cells from the support. It would therefore have been obvious for the person of ordinary skill in the art at the time the invention was made to try chemical treatment for harvesting cells from the channels of Davies et al.

Therefore, the invention as a whole would have been prima facie obvious to a person of ordinary skill at the time the invention was made.

Claims 18, 19 and 22-24 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Halling et al. (WO 90/02170).

Claims 18, 19 and 22-24 are drawn to a method for cultivating eukaryotic microorganisms comprising providing a perforated support having first and second major surfaces wherein the support being a sheet-shaped material and being impermeable to eukaryotic microorganisms or blue algae, applying the eukaryotic microorganisms or blue algae to the first major surface wherein the microorganisms remain immobilized, flowing an aqueous solution along the second major surface,

wherein the flowing aqueous solution being transported to the first major surface by capillary forces, and the eukaryotic microorganisms or blue algae grow on the first major surface (claim 18); a limitation to the aqueous solution forming a distributing layer to distribute the solution across the second major surface of each perforated support (claim 19); a limitation to the support and/or the distributing layer being hydrophilic (claims 22-24).

Halling et al. teach a method and an apparatus (membrane bioreactor) for culturing microbial cells (plant and animal cells) immobilized on the outside (shell side; first major surface) of a membrane through which a culture medium can flow (inside of the membrane; tube side; second major surface), and through a support matrix surrounding the membrane (Abstract, p.1, line 3; p.1, line 33-p.2, line 3; p.2 line 36 to p.3, line 4; and Fig. 1-3). The material of the perforated support of Halling et al. is a macroporous ceramic material (p.2, line 5), which is inorganic and inherently hydrophilic.

Although Halling et al. do not teach the support being sheet-shaped, it would have been obvious to a person of ordinary skill in the art to modify the shape of the bioreactor of Halling et al. because the change of shape in a material used in the invention would be obvious to a person of ordinary skill in the art in the absence of persuasive evidence to prove the significance of such shape in the invention.

M.P.E.P. §2144.04 states that "*In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966) (The court held that the configuration of the claimed disposable plastic nursing container was a matter of choice which a person of ordinary skill in the art would have

found obvious absent persuasive evidence that the particular configuration of the claimed container was significant.).

Therefore, the invention as a whole would have been prima facie obvious to a person of ordinary skill at the time the invention was made.

(10) Response to Argument

Group 1 – claims 18-28 based on Davies et al. under 35 U.S.C.§102

In the argument to the claim rejection based on Davies et al. under 35 U.S.C.§102, Appellant argued that the techniques of Davies are nothing similar to the features recited in claim 18. Appellant argued that the features of the current application are not disclosed or suggested by Davies et al. The features of the current invention are a sheet-shaped perforated support having a first major surface comprising eukaryotic microorganisms or blue algae, and a second major surface having an aqueous solution being supplied. And the aqueous solution is transported through the sheet-shaped perforated support by capillary forces.

The examiner disagrees with the appellant's assertion that Davies et al. do not disclose or suggest the features claimed in the current application.

The shape of support disclosed by Davies et al. is indeed sheet-shaped. According to Merriam-Webster dictionary, the term “sheet” is defined as "a portion of something that is thin in comparison to its length and breadth". Therefore, the structure (#1) is clearly considered as a sheet, and thus is deemed to meet the limitation of “sheet-shaped”.

Furthermore, the material of the structure of Davies et al. is disclosed to be plastic materials such as ceramic or metal oxide. These materials are well known in the art as porous (thus, perforated) and Davies et al. teach that the ceramic monolith structure has the interior walls being porous (col. 3, lines 47-50). Therefore, the support of Davies et al. is a sheet-shaped perforated support.

Davies et al. teach that there are channels formed in the support, and there are two groups of channels; one for colonization of cells (colonized channels; #3 of Fig. 1) and the other for nutrients (liquid and/or gas; #2 of Fig. 1) (non-colonized channels).

Since the colonized channels, where the cells are immobilized, constitute a half of the total channels formed in the support of Davies et al., and each channel has four inner surfaces (walls), the surface area formed by the colonized channels (that is a half of total area formed by channels) constitutes a significantly large portion from the total surface area in the support. Therefore, it is reasonable to interpret that the surface area occupied by the cells (i.e. colonized channels) is a major surface area as to the whole surface area formed by the support structure based on the Figure 1 of Davies et al. Therefore, the examiner considers the colonized channels as a group constitute a major surface area for the eukaryotic microorganisms, and the non-colonized channels as a group being another major surface present in the sheet-shaped perforated support of Davies et al.

Furthermore, Davies et al. teach that biological material (cells) in the channels cannot pass to adjoining channels (non-colonized channels), and liquid and/or gas may be transferred between the first channels and the second channels. The cells colonized

in the channels can be plant or animal cells (col. 2, lines 54-56). Thus, the nutrient is transferred across the porous walls to the biological material contained in the first channels (col. 2, lines 1-18). Therefore, this teaching meets the limitation of the sheet-shaped perforated support being essentially impermeable to the eukaryotic microorganisms.

Appellant argues that the aqueous solution does not flow along any major surface of Davies et al. This is not correct since Davies et al. particularly teach that at least some of the second channels are associated with inlet conduit means for the supply to these second channels of nutrient and also with outlet conduit means for the removal of nutrient from the channels (col. 4, lines 6-11). Therefore, the nutrient (media) is not stationary as indicated by the applicant.

With regard to the capillary forces mediating the transport of the aqueous solution from the second major surface to the first major surface, the flow of nutrient media through the second channels and the porous walls of the sheet-shaped perforated support of Davies et al. inherently possess capillary forces for the diffusion of the nutrient media through the porous walls. Capillary action is understood to be mediated by “capillary forces". Capillary action or capillarity is defined as a tendency of a liquid to rise in narrow tubes (capillary tubes) or to be drawn into small openings or passages (pores). For example, when a porous membrane or paper is getting wet by water, the water molecules get into the membrane or paper through the pores. This phenomenon is known as capillary action, and it is mediated by capillary forces. Since the liquid (nutrient media) flowing in the second channels of Davies et al. is transported

through the porous walls made of ceramic materials of Davies et al., this transport is also understood as capillary action or capillarity mediated by capillary forces.

Therefore, based on the analyses discussed above, the examiner believes that Davies et al. teach the limitations of the claimed invention and thus, anticipate the claimed invention, and the rejection was valid.

Group 2-claim 28 based on Davies et al. under 35 U.S.C.§102

Appellant argued that Davies et al. fail to teach or suggest the use of first and second sheet-shaped perforated supports and the aqueous solution between the second major surface of the first sheet-shaped perforated support and a second major surface of a second sheet-shaped perforated support, wherein the first and second sheet-shaped perforated supports have their second major surfaces facing each other and arranged essentially in parallel to each other.

The examiner previously interpreted the whole reactor of Davies et al. as shown in Fig. 1 of Davies et al. as a sheet-shaped perforated support. However, the interpretation of the “a sheet-shaped perforated support” can be also applicable to the individual channel forming walls of the reactor of Davies et al.

Each porous wall of the channels of the reactor is considered as a perforated support because the four walls form a channel to allow cells to be confined within and nutrients flow through, and further these walls are building blocks of the whole structure. Thus, it is reasonable to construe that the wall of each channel is a perforated support. Moreover, the shape of the wall is considered as sheet-shaped, and thus, each wall is

considered as a sheet-shaped perforated support.

Moreover, each wall has two sides; one facing colonized channels, and the other facing channels for nutrients. Thus, the wall has two major surfaces.

With regard to the limitation of claim 28, two parallel walls (two sheet-shaped perforated supports), forming a channel for nutrients, are facing each other and, the other side of these walls is facing channels for cell culture. Thus, this configuration meets the limitation of claim 28.

Ground 3- Claims 18-30 based on Davies et al. under 35 U.S.C.§103

Appellant argued that since Davies et al. do not anticipate the claims, the reference does not render the claimed invention obvious.

This argument is not persuasive because as discussed above, Davies et al. anticipate the claimed invention of claims 18-28 and thus, also render claims 18-28 obvious.

Ground 4- Claim 30 based on Davies et al. under 35 U.S.C.§103

Appellant argued that the examiner’s analysis of claim 30 based on "result-effective variables" is misplaced, and further asserted that claim 30 does not recite any variable, much less a variable that is recognized by the prior art as affecting a particular result. It is acknowledged that the instant claim does not disclose any variable. It is rather meant that the cell dissociation can be optimized by selecting means suitable for the cells of interest based on the nature of the cells grown in the support. It is extremely

well known that a chemical treatment is one of a finite number of solutions for cell dissociation, and routinely used in the laboratories and industry. Thus, a person of ordinary skill in the art would try to optimize the step of cell dissociation and for that, a person of ordinary skill in the art would choose an appropriate means depending on the nature of cells grown from the known means of cell dissociation including chemical treatment.

Furthermore, since the chemical treatment for cell dissociation is one of a finite number of solutions known in the art, it would therefore have been obvious for the person of ordinary skill in the art at the time the invention was made to try chemical treatment for harvesting cells grown on the support of Davies et al.

The Supreme Court recently states in KSR v. Teleflex (550 US82 USPQ2d 1385, 2007) “The same constricted analysis led the Court of Appeals to conclude, in error, that a patent claim cannot be proved obvious merely by showing that the combination of elements was “obvious to try.” Id., at 289 (internal quotation marks omitted). When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. In that instance the fact that a combination was obvious to try might show that it was obvious under §103.” See also M.P.E.P. §2141.

Group 5 – Claims 18, 19 and 22-24 based on Halling et al. under 35 U.S.C.§103

Appellant argued that Halling et al. fail to disclose or suggest a method for eukaryotic microorganisms or blue algae that uses a sheet-shaped perforated support. Appellant asserted that the bioreactor of Halling et al. has an inner flow channel surrounded by a support matrix, and the tubular device of Halling is not anything like a sheet-shaped perforated support.

The examiner disagrees with the assertion.

The cell culture device or bioreactor of Halling et al. is composed of tubular support ceramic matrix (#12 of Figs 1-3 of Halling et al.), forming inner flow channel for liquid flow, a microporous membrane (#13 of Figs. 1-3), permeable by liquid but not by cells, formed on the inner surface of the channel. Cells are immobilized and grown on the outer surface of the membrane (shell side). Thus, the porous ceramic membrane prevents cells passing through the membrane. Whereas the liquid flow through the inner channel would pass through the pores of the microporous membrane. Halling et al. teach that cells are immobilized in between the pores of the membrane (ceramic membrane), and the nutrients diffuse across the membrane to the cells (p. 2, lines 18-25). As discussed above in the claim rejection based on Davies et al., the diffusion of liquid from the inner tubular channel through the pores of the ceramic membrane is believed to be mediated by capillary forces.

Although the shape of microporous membrane is not particularly sheet-shaped, however, it would have been obvious to a person of ordinary skill in the art to modify the shape of the membrane or the structure of the bioreactor from tubular shape to rectangular or square shape. It is well established by the court that the change of design

is obvious. *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966) (The court held that the configuration of the claimed disposable plastic nursing container was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed container was significant.). See M.P.E.P. §2144.04.

Furthermore, the microporous membrane used in the bioreactor of Halling et al. is considered as sheet-shaped, because even though the configuration of the microporous membrane of Halling et al. is tubular, the membrane per se is in sheet shape in nature. Whether a sheet-shaped membrane is configured as a tubular shape or in a rolled configuration, the membrane is considered as sheet shaped because the definition of “membrane” is “a thin soft pliable sheet or layer” according to Merriam-Webster dictionary. Thus, the microporous membrane of Halling et al. is considered as a sheet-shaped perforated support rolled in a tubular configuration.

Appellant further argued that the sheet-shaped perforated support of the current invention promotes the growth of eukaryotic microorganisms or blue algae, and facilitates much easier removal of such organisms than can be achieved using a tubular structure to grow organisms. This argument is merely the argument of counsel and is unsupported by evidence or declarations of those skilled in the art. Attorney’s argument is not evidence unless it is an admission, in which case, an examiner may use the admission in making a rejection. See M.P.E.P. § 2129 and § 2144.03 for a discussion of admissions as prior art. Counsel's arguments cannot take the place of objective evidence. *In re Schulze*, 145 USPQ 716 (CCPA 1965); *In re Cole*, 140 USPQ 230

(CCPA 1964); and especially *In re Langer*, 183 USPQ 288 (CCPA 1974). See M.P.E.P. § 716.01(c) for examples of attorney statements that are not evidence and that must be supported by an appropriate affidavit or declaration.

Group 6 – Claims 20 and 21 under 35 U.S.C.§112

The argument presented by Appellant is persuasive and the rejection is withdrawn.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Leon B Lankford/
Primary Examiner, Art Unit 1651

Taeyoon Kim

Conferees:

/Cecilia Tsang/

Supervisory Patent Examiner, Art Unit 1654

/Michael G. Wityshyn/
Supervisory Patent Examiner
Art Unit 1651